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Pleurothallis, Habenaria, Pogonia, and Microstylis. The descriptions of species in each genus are preceded by determinative keys.—J. M. GREENMAN.

North American flora.⁹—Volume IX, part 3, of this work consists of an elaboration of the Agaricales as follows: Boletaceae and Chantereleae by W. A. MURRILL, and Lactariae (pars) by G. S. BURLINGHAM. New species are described in Gyroporus (1), Ceriomyces (5), and Suillellus (1). Three new monotypic genera of the Agaricaceae are proposed, namely, *Polyozellus*, *Plicaturella*, and *Chlorophyllum*.—J. M. GREENMAN.

NOTES FOR STUDENTS

Graft hybrids.—The question of graft hybrids continues to grow in interest. WINKLER's previous papers on this subject have already been reviewed in this journal.¹⁰ His latest contribution¹¹ deals with the second and later generations of the graft hybrids between *Solanum nigrum* and *S. lycopersicum*, and with the chromosome numbers in these forms. It is found that the different graft hybrids fall into a series resembling most one or the other parent, in the following order: *S. nigrum*, *S. Gaertnerianum*, *S. Darwinianum*, *S. tubingenense*, *S. proteus*, *S. Koelreuterianum*, *S. lycopersicum*, the first three graft hybrids being most like *S. nigrum* and the last two nearest *S. lycopersicum*. In the F₂ the first three revert to *S. nigrum*, while the other two produce the tomato. Large numbers of offspring were grown in some cases, e.g., 1200 individuals in the F₂ of *S. tubingenense*, all of which without exception were pure *S. nigrum*. The F₃ and F₄ and later generations continued true *S. nigrum*. Regenerated adventive shoots also reverted only to the nightshade, but in the case of *S. proteus* reversions to both parents occurred, and in this and other cases various chimeras appeared from adventive shoots. *S. Gaertnerianum* is almost sterile and shows little tendency even to parthenocarpy, which is more frequent in some of the others.

Crosses of the graft hybrids with the parent they most resembled gave similar results, e.g., *S. tubingenense* × *S. nigrum* gave only *S. nigrum*. Crosses with the more distant parent, as *S. tubingenense* × *S. lycopersicum*, failed to produce seeds, although parthenocarpy frequently occurred.

Regarding the chromosomes, in *S. lycopersicum* the numbers were 12 (haploid) and 24 (diploid), and in *S. nigrum* 36 and approximately 72, therefore three times as many. If a fusion of nuclei took place in the production of the graft hybrid, one might expect the latter to have 72+24 (96) chromosomes unless a regulation in the number afterward occurred; but this number is not found. Instead, *S. tubingenense*, *S. Darwinianum*, and *S. Gaertnerianum* were found to have 36 chromosomes in their pollen mother cells (after reduction), while the other two

⁹ North American flora. Vol. IX, part 3. pp. 133-200. New York Botanical Garden. 1910.

¹⁰ BOT. GAZETTE 47:84, 250; 48:478. 1909.

¹¹ WINKLER, HANS, Ueber die Nachkommenschaft der Solanum-Pfropfbastarde und die Chromozomenzahlen ihrer Keimzellen. Zeit. Bot. 2:1-38. 1909.

possessed 12 chromosomes. Therefore in both cases the numbers are the same as in the parents to which they revert in the F_2 . This of course does not eliminate the possibility that a fusion of nuclei had occurred, and that afterward a regulation in the number took place, perhaps just previous to reduction or at the time of reduction.

STRASBURGER¹² has made a number of *Solanum* grafts according to WINKLER's method, and examined the growing tissues along their line of union, to determine whether cell fusions take place. He found no indication that such is the case, but of course negative evidence in such a matter is inconclusive, for the graft hybrids are rare at best. STRASBURGER concludes that WINKLER's cases are really complicated chimeras, in which the tissues of the two parents are intimately blended in the growing points. He proposes to call them "hyperchimeras," and cites various analogous cases of very intimate relationship, such as between parasite and host.

WINKLER, however, is still convinced that these cases are true graft hybrids, although concurring in STRASBURGER's opinion that *Cytisus Adami*, which STRASBURGER¹³ showed to have the same number of chromosomes as its parents, is a chimera. He proposes to determine the chromosome number in the somatic cells of the *Solanum* hybrids to see whether it is higher than in the germ cells, and contends that, even though no fusion of nuclei occurs, in its absence the effect of the cytoplasm of one type of cell upon the other will be necessary to explain the production of the characters of the graft hybrids. This view scarcely seems necessary to explain the present facts, but WINKLER's further cytological papers to determine what actually occurs will be awaited with interest. It is hoped that full accounts, with figures, will be forthcoming.

BAUR¹⁴ has reiterated recently his belief that these forms are explainable as periclinal chimeras, varying in the arrangement of the layers in the growing point, and thinks that the case of *Crataegomespilus* can be explained in the same way.

The fact that in these *Solanums* the number of chromosomes is so unlike adds much to the interest of the situation.—R. R. GATES.

Sexuality of the rusts.—The differences of nuclear behavior in the rusts as described by BLACKMAN and CHRISTMAN have led KURSSANOW¹⁵ to investigate a similar form. According to BLACKMAN,¹⁶ in the caeoma of *Phragmidium violaceum* the nucleus of a vegetative cell passes into that of a specially differentiated female

¹² STRASBURGER, E., Meine Stellungnahme zur Frage der Pfropfbastarde. Ber. Deutsch. Bot. Gesell. 27:511-528. 1909.

¹³ ———, Ueber die Individualität der Chromosomen und die Pfropfhybriden-Frage. Jahrb. Wiss. Bot. 44:482-555. pls. 5-7. fig. 1. 1907.

¹⁴ BAUR, E., Pfropfbastarde, Periklinalchimären, und Hyperchimären. Ber. Deutsch. Bot. Gesell. 27:603-605. 1910.

¹⁵ KURSSANOW, L., Zur Sexualität der Rostpilze. Zeit. Bot. 2:81-93. pl. 1. 1910.

¹⁶ BLACKMAN, V. H., On the fertilization, alternation of generations, and the general cytology of the Uredineae. Annals of Botany 18:323-373. 1904.